CLAIMS

1. Process to determine locally the shape of geological horizons, in which there is constructed a continuous function $S_{ij,k}(t)$ by interpolation or approximation of the discrete seismic traces of a three-dimensional seismic matrix, said $S_{ij,k}(t)$'s function being designated as a "continous local seismic trace", comprising the following steps:

a). using as optimum offset of two adjacent continuous local seismic traces, the value of offset rendering maximal their correlation function, with optimal offset not being necessarily a whole multiple of the vertical sampling interval;

b). taking as conditional neighborhood of a "central" continuous local seismic trace $S_{ij,k}(t)$ the sub-neighborhood consisting in adjacent traces $S_{pq,k}(t)$ corresponding to optimum offsets $h_{ij,pq,k}$ associated with correlations $R_{ij,pq,k}(h_{ij,pq,k})$ greater than a predetermined threshold comprised between 0 and 1;

c). defining for each continuous local seismic trace $S_{pq,k}(t)$ of the conditional neighborhood, a value of residual relative to said "central" continuous local seismic trace $S_{ij,k}(t)$ comprising parametric coefficients;

d). determining the parametric coefficients $a_{ij,k}$ and $b_{ij,k}$ by minimization of a set of residuals on the conditional neighborhood.

2. Process according to claim 1, in which the residual values of step c) are absolute values of parametric differential form, for example $|a_{ij,k}.(p- i) + b_{ij,k}.(q-j) - h_{ij,pq,k}|$,

in which $a_{ij,k}$ and $b_{ij,k}$ are parameters and $h_{ij,pq,k}$ is the optimum offset maintained between the "central" continuous

local seismic trace $S_{ij,k}(t)$ and an adjacent continuous local seismic trace $S_{pq,k}(t)$.

3. Process according to claim 1 or claim 2, in which the minimization of the assembly of residuals $\rho_{ij,pq,k}$ on the conditional neighborhood comprises a minimization of a sum of powers of the residuals, of the form

$$C^{\alpha}(i,j,k) = \sum_{p,q} (\rho_{ij,pq,k})^{\alpha}$$

, in which α is a power greater than 1.

4. Process according to claim 1, in which the coefficients $a_{ij,k}$ and $b_{ij,k}$ determined in step b) are used to define a unitary vector N(i,j,k) of coordinates $N^x(i,j,k)$, $N^y(i,j,k)$, $N^t(i,j,k)$, for example of the form:

$$N^x(i,j,k) = \frac{a_{ij,k}}{\sqrt{(a_{ij,k})^2 + (b_{ij,k})^2 + 1}}$$

$$N^y(i,j,k) = \frac{b_{ij,k}}{\sqrt{(a_{ij,k})^2 + (b_{ij,k})^2 + 1}}$$

$$N^t(i,j,k) = \frac{1}{\sqrt{(a_{ij,k})^2 + (b_{ij,k})^2 - 1}}$$

and in which there is selected this unitary vector as normal unitary vector (orthogonal) to the horizon of the node (i, j, k).

5. Process according to claim 4, in which there is used the set of normal unitary vectors N(i, j, k) to define the field of the normal unitary vectors, for the display on a screen of the seismic horizon profiles.

6. Process according to one of claims 1 to 3, in which there is selected as the index of curvature an increase in function of the residuals comprising the parametric coefficients determined in step d).

7. Device for practicing the process according to any one of claims 1 to 4, comprising means to use as optimum offset of two adjacent continuous local seismic traces, the value of offset rendering maximum their correlation function, means to take as conditional neighborhood of a "central" continuous local seismic trace $S_{ij,k}(t)$ the sub-neighborhood consisting in adjacent traces $S_{pq,k}(t)$ corresponding to optimum offsets associated with correlations $R_{ij,pq,k}(h)$ greater than a predetermined threshold comprised between 0 and 1, means to define for each continuous local seismic trace $S_{pq,k}(t)$ of the conditional neighborhood a value of residual relative to said "central" continuous local seismic trace $S_{ij,k}(t)$ comprising parametric coefficients, and means to determine the parametric coefficients by minimization of the set of residuals on the conditional neighborhood.

8. Device according to claim 7, comprising memorization means and visualization means of seismic parameters determined with the help of the process according to any one of claims 1 to 6.

9. Computer software package, comprising program code elements to carry out the steps of the process according to any one of claims 1 to 5, when said program is executed by a computer.

10. Computer software package, comprising elements of program code to carry out the steps of the process according to claim 6, when said program is executed by a computer.